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Scaling Up the System of Rice Intensification in 13 West African Countries

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Abstract

RICOWAS, the largest SRI scaling-up project to date, will be implemented over four years in 13 West African countries, starting in January 2023. RICOWAS can be considered a follow-on project to the SRI-WAAPP project, which was implemented from 2014-2016 and reached 50,048 farmers growing rice using the SRI method at 1,088 sites on 13,944 hectares across 13 countries, with 56% and 86% SRI yield increases for irrigated and rainfed lowland systems, respectively, over conventional rice production. The objective of RICOWAS is to improve climate resilience and increase the rice system productivity of smallholder rice farmers across West Africa using a climate-resilient rice production approach. The project aims to reach at least 153,000 rice growers with indirect benefits to an estimated 1.5 million people. Given the highly diverse nature of rice systems and climate zones in West Africa, RICOWAS will apply the conceptual framework for SRI with four interactive crop production principles, i) encourage early and healthy plant establishment, ii) minimize competition among plants, iii) build up fertile soils rich with organic matter and beneficial soil biota, and iv) manage water carefully to avoid both flooding and water stress. These principles remain the same no matter where SRI is applied and provide the foundation for adaptation to local conditions. With SRI at the center, RICOWAS additionally integrates agro-ecozone specific Sustainable Land and Water Management (SLWM) practices to maximize the adaptation potential of the vulnerable rice production systems throughout West Africa, calling the new approach Climate-Resilient Rice Production (CRRP).

Keywords: Sustainable Land and Water Management (SLWM), agroecology, climate-resilience, regenerative agriculture

Background of SRI in West Africa

In 2010, West Africa produced 7.9 million tons of milled rice and imported an additional 5.7 million tons to satisfy demand. The ECOWAS Rice Commission estimates that by 2025 yearly rice consumption in West Africa will increase to 24 million tons (value of 12 billion USD), triple the 2010 production. The ECOWAS States – through their "Rice Offensive," supported by the National Rice Development Strategies – target self-sufficiency in rice production by 2025 (ECOWAS, 2012; Fofana *et al.,* 2014). Key risks for rice production in West Africa stem from increasing climate variability with exacerbated dry spells, droughts, and heatwaves, as well as greater likelihoods of floods, shortage of irrigation water, strong winds and storms, and changes in pest and disease pressures – all of which can lead to substantial rice yield reductions or crop failure (Riede *et al.,* 2016; Sultan & Gaetani, 2016; Sylla *et al.,* 2016).

The System of Rice Intensification (SRI), an agro-ecological, climate-smart and low-input methodology for increasing rice productivity, can play a crucial role in closing the rice production gap in West Africa. Developed in Madagascar and practiced today in more than 60 countries, the SRI methodology allows increased yields, often by 50% or more, while using 90% less seed, 30-50% less water, and decreased amounts of agro-chemicals (Styger & Uphoff, 2016). SRI trials in West Africa began in 2000. Larger-scale expansion occurred first in Mali, starting in 2007. Between 2010-2012, Mali SRI practitioners provided technical training to their peers in Benin, Burkina Faso, Ghana, Nigeria, Senegal and Togo. By 2012, an estimated 2500 farmers practiced SRI in ten countries of West Africa.

Given the growing interest in SRI across the region, the regional project **"Improving and Scaling up the System of Rice Intensification in West Africa"** (SRI-WAAPP) was commissioned and supervised by the West and Central African Council for Agricultural Research and Development (CORAF) as part of the West Africa Agriculture Productivity Program (WAAPP), supported by the World Bank under the institutional umbrella of the Economic Community of West African States (ECOWAS). The project was coordinated by the National Center of Specialization on Rice, Institute of Rural Economy (CNS-RIZ/IER), Mali, and the SRI-Rice Center, Cornell University, USA. The SRI-WAAPP project ran from 2014 to 2016 in Benin, Burkina Faso, Côte d'Ivoire, The Gambia, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo (Styger & Traore, 2018). By the end of the project, 50,048 farmers – of whom 33% were women – grew rice using the SRI method at 1,088 sites on 13,944 hectares across the 13 countries. The project trained 33,514 people, mostly farmers, including 1032 technicians. The number of institutions working with SRI increased from 49 to 215. The average SRI yield for irrigated rice was 6.6 t/ha compared to 4.23 t/ha for conventional rice (N=292 sites), a 56% increase. For rainfed lowland systems, SRI yields averaged 4.71 t/ha, compared to 2.53 t/ha for conventional rice (N=441), an 86% increase. The estimated total additional quantity of rice produced with SRI at the SRI-WAAPP sites compared to conventional rice during the 2015/2016 growing season alone was 31,458 tons of paddy, or 20,113 tons of milled rice, representing a value of 10.07 million USD dollars (Styger &Traore, 2018).

The RICOWAS project

The RICOWAS project was designed to build on the achievements of the SRI-WAAPP project. RICOWAS will be the largest SRI scaling-up project to date, implemented over four years from 2023-2027 in the same 13 West African countries as SRI-WAAPP. Funded by the Adaptation Fund (AF), the Sahara and Sahel Observatory (OSS) will oversee overall project implementation. CNS-RIZ/IER in Mali will provide regional technical coordination in partnership with the Climate-Resilient Farming Systems program at Cornell University. At the country level, national research and extension institutions will be in charge of project execution in collaboration with NGOs and farmer organizations, and with technical and scientific partners from the public, private, and civil society sectors (Sahara and Sahel Observatory, 2021). The objective of RICOWAS is to improve climate resilience and increase rice system productivity of smallholder rice farmers across West Africa using a climate-resilient rice production approach. The project aims to reach at least 153,000 rice growers and indirectly benefit 1.5 million people. Figure 1 shows the RICOWAS project intervention zones in the 13 countries.

Figure 1: RICOWAS project intervention zones of the 13 participating countries.

Regional SRI scaling-up approach developed by the RICOWAS project

Rice production systems in West Africa range from rainfed upland (43% of rice area) and rainfed lowland (40% of rice area) to irrigated systems (17% of rice area), and to the lesser-known mangrove, deep-water, and recession rice systems (5% of rice area). Rice is planted in all climate zones, from the arid desert climates in northern Senegal, northern Mali, and Niger to rainforest regions in Liberia, Guinea, and Sierra Leone (Diagne *et al*., 2013). Given the highly diverse nature of rice systems and climate zones in West Africa, it is important that all stakeholders share the same understanding of SRI. During the SRI-WAAPP project, a new conceptual and operational framework for SRI was implemented for the first time (Styger, 2017). The same framework will also be used by the RICOWAS project. How the conceptual framework is applied to different rice systems, as well as to other crops, is illustrated in Figure 2.

The conceptual framework identifies **four interactive SRI principles** that define the SRI methodology. They are i) encourage early and healthy plant establishment, ii) minimize competition among plants, iii) build up fertile soils rich with organic matter and beneficial soil biota, iv) manage water carefully to avoid both flooding and water stress. These principles remain the same no matter where SRI is applied and provide the foundation for the practices that are adapted to local conditions. SRI was originally developed for irrigated rice. But when farmers understood the synergies created when applying the SRI principles together, they continued to adapt cropping practices to local conditions. The SRI practices can therefore vary for different i) rice systems (rainfed lowland, rainfed upland, irrigated systems, mangrove systems, recession systems), ii) agro-ecozones and climate zones, as well as iii) for other crops, especially monocotyledons with good tillering potential.

Expanding the SRI method with the Climate-Resilient Rice Production approach

The RICOWAS project adopts a new comprehensive approach, entitled **Climate-Resilient Rice Production (CRRP)**. CRRP is based on the SRI methodology in combination with location-specific Sustainable Land and Water Management (SLWM) practices, and if indicated with Integrated Pest (and disease) Management (IPM). CRRP is used as an adaptation measure to different and location-specific climate threats. The approach recognizes that the foundation of climate-resilient rice systems lies in integrated soil and water management, keeping soils structurally intact and regenerating them with organic matter, both keys to developing healthy soils. Storing water within a plot and at the landscape level, and being able to add or remove water from rice fields as needed, are key to developing sustainable water management approaches (Sahara and Sahel Observatory, 2021).

Findings from the locally adapted practices implemented in the 13 countries will be pooled, and best practices synthesized for the different climate zones and rice systems. Using an iterative and circular approach, these best practices can be improved and fine-tuned over the life of the project. This highly participatory process integrates inputs from farmers, researchers, and technicians, and will also draw on successful ideas and experiences from other parts of the world. The RICOWAS project will use a modular approach for trainings and technical manuals, covering CRRP topics as adapted to different climate zones and rice systems. This approach allows a common understanding of CRRP at the regional level while developing and adapting innovations at the local level. The project will also provide access to tools and equipment that support the adoption of SRI and SLWM. The project will build on current institutions, strengthening their institutional and human capacities according to opportunities and needs. It will also rely on national decision-making and leadership in the implementation of the project. CRRP champions – including farmers and technicians – will be encouraged to participate in the project, based on their engagement and commitment to CRRP. RICOWAS will promote national networks and build on the regional community of practice for CRRP that started under the SRI-WAAPP project. (Sahara and Sahel Observatory, 2021)

Adopting a climate zone and regional approach

Each of the four climate zones of West Africa crosses between five and ten of the 13 countries, and most countries are spread across more than one climate zone as shown in Figure 3 (CILSS, 2016). A regional and climate zone approach for scaling-up climate-resilient rice production has multiple advantages: i) a larger group of

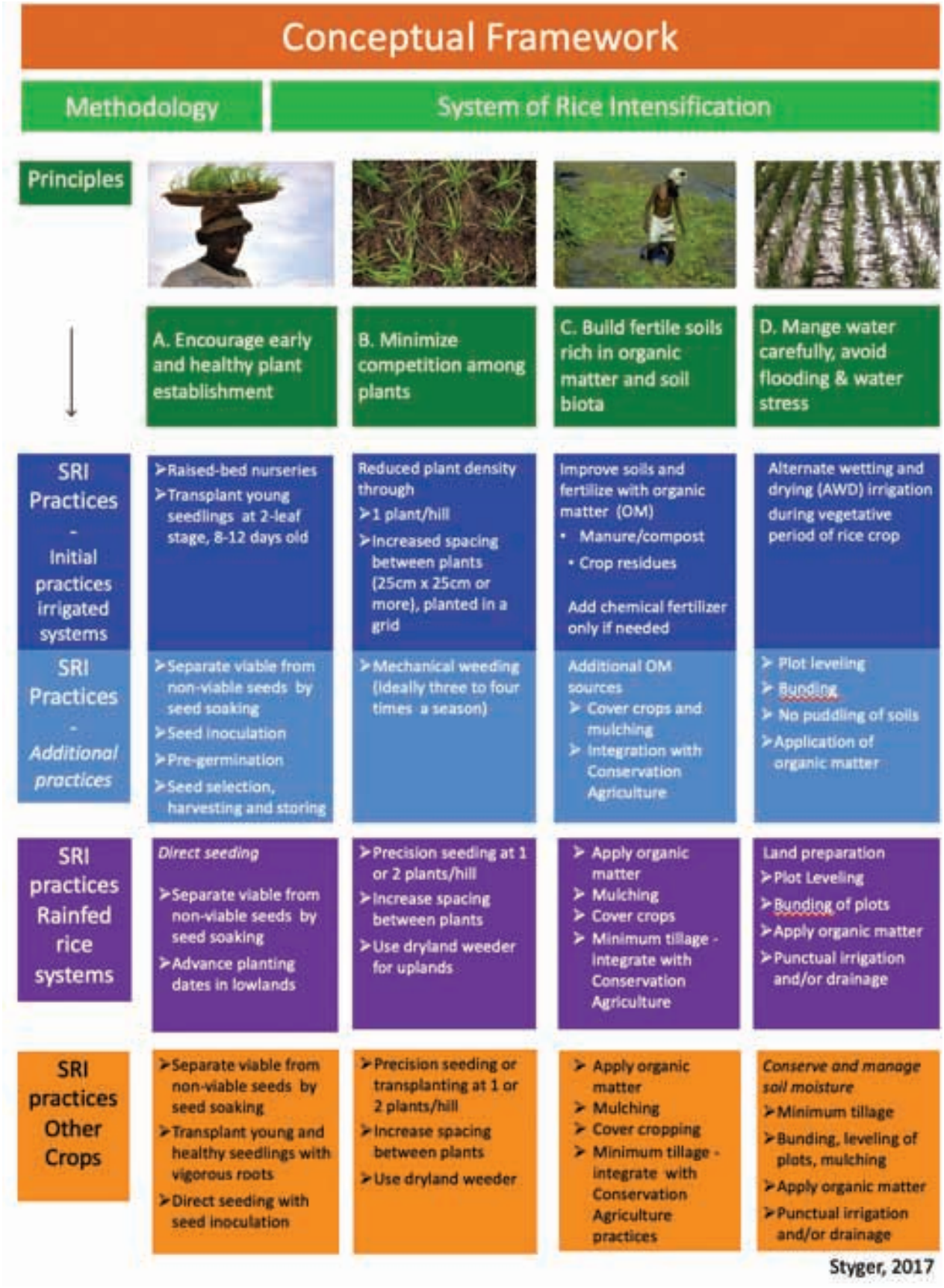

Figure 2: Operational conceptual framework for the System of Rice Intensification (SRI) and the System of Crop Intensification (SCI) (Styger, 2017)

people from several countries can collaborate on the same topics, ii) the innovation process can be accelerated, and iii) locally adapted innovations developed in one country can easily be shared with other countries working in the same climate zone and/or rice systems. The map of the project zones (Figure 1) clearly depicts how smaller project zones at the border of one country can fuse into larger zones when combined with the border zones of their neighboring countries.

Figure 3: Bioclimatic regions of West Africa (CILSS, 2016)

Conclusions

The RICOWAS will be the largest SRI scaling-up project to date, implemented in 13 West African countries. Given the highly diverse rice systems, the RICOWAS project will build its technical approach on i) a simple conceptual framework with four SRI principles that provide guidance on adapting cropping practices to local conditions, and on ii) expanding the implementation approach beyond SRI by integrating principles and practices from other agro-ecological approaches, summarized in the Sustainable Land and Water Management approach. By doing so, the project harmonizes the operational approach, as everyone shares the same understanding. It also facilitates data collection, comparisons, and learning across rice systems and climate zones. Most importantly, RICOWAS will favor the implementation of location-specific soil regenerating and agroecological practices and will facilitate effective innovation development with a focus on rice productivity increase and climate adaptation. The implementation approach developed by RICOWAS might also serve as a model for other SRI scaling-up projects in other parts of the world.

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